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1- General

1.1 - General safety recommendations

- The balancing machine should only be used by duly authorized and trained personnel.
- The balancing machine should not be used for purposes other than those described in the instruction manual.
- Under no way should the balancing machine be modified except for those modifications made explicitly by the manufacturer.
- Never remove the safety devices. Any work on the machine should only be carried out by duly authorized specialist personnel.
- Do not use strong jets of compressed air for cleaning.
- Use alcohol to clean plastic panels or shelves (AVOID LIQUIDS CONTAINING SOLVENTS).
- Before starting the wheel balancing cycle, make sure that the wheel is securely locked on the adapter.
- The machine operator should not wear clothes with flapping edges. Make sure that unauthorized personnel do not approach the balancing machine during the work cycle.
- Avoid placing counterweights or other objects in the base which could impair the correct operation of the balancing machine.

1.1.1 - Standard safety devices

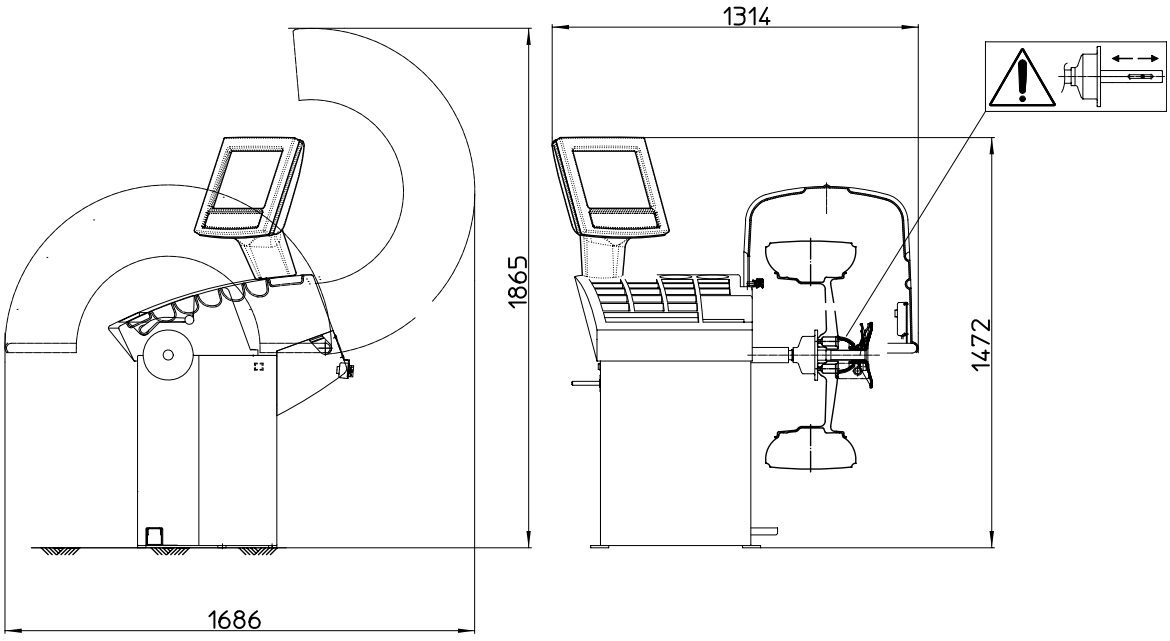
- STOP push button for stopping the wheel under emergency conditions.
- The safety guard of high impact plastic is with shape and size designed to prevent risk of counterweights from flying out in any direction except towards the floor.
- A microswitch prevents starting the machine if the guard is not lowered and stops the wheel whenever the guard is raised.

1.2 - Field of application

The machine is designed for balancing car or motorcycle wheels weighing less than 75 kg. It can be operated within a temperature range of 0° to + 45°C.
It can measure the geometric radial run-out of the wheels (optional)
It can print a balancing certificate (option).

1.3 - Overall dimensions (42" guard)

1



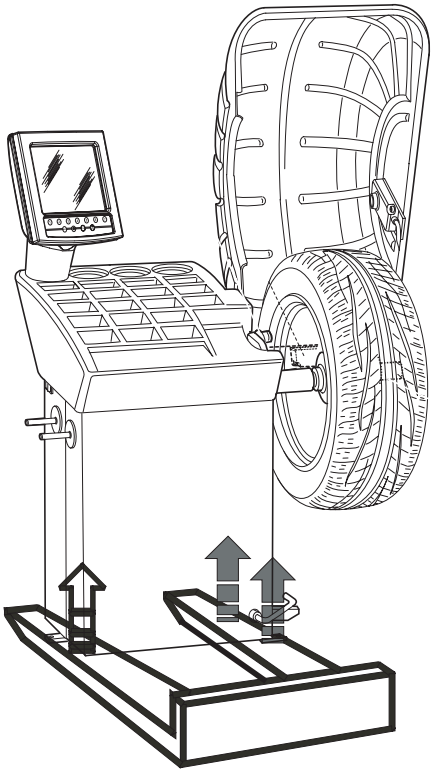
1.4 - Specification

Single phase power supply.....115 - 230 V 50-60 Hz
Protection class .....IP 54
Max. power consumption.....1,1 Kw
Monitor .....SVGA 15"
Balancing speed approx. .....180 min^{-1}
Cycle time for average wheel (14 Kg) .....6 seconds
Balancing accuracy .....0,5 grams
Position resolution .....± 1.4 °
Average noise level .....< 70 dB(A)
Distance rim - machine.....0 - 280 mm (400 mm can be preset)
Rim width setting range .....1.5" ÷ 20" or 40 ÷ 510 mm
Diameter setting range .....10" ÷ 30" or 265 ÷ 765 mm
Total wheel diameter within guard .....1067mm (42")
Total wheel width within guard.....500 mm (42")
Min/max. compressed air pressure .....7 ÷ 10 Kg/cm^2
.....approx. 0.7 to 1 Mpa;
.....approx. 7 to 10 BAR;
.....approx. 100 to 145 PSI.

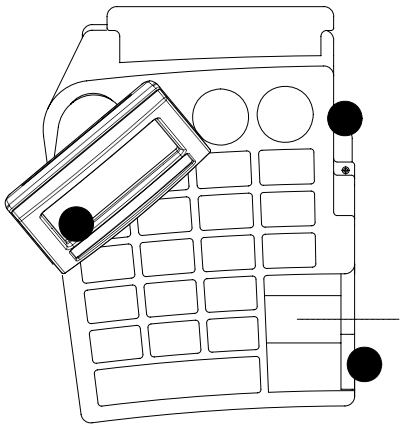
2 - Handling and hoisting

N.B.: DO NOT HOIST THE WHEEL BALANCER USING DIFFERENT GRIPS.

2



2a



3 - Commissioning

3.1 - Anchoring

The machine can be operated on any flat non-resilient floor.
Make sure that the machine rests solely on the three support points provided (fig. 2a).
If possible, it is advisable to anchor to the floor using relative mounting feet (see fig. 2a) in the event of continual use with wheels weighing over 35 Kg.

3.2 - Electrical connection

The machine is supplied with a single phase mains cable plus earth (ground).
The supply voltage (and mains frequency) is given on the machine nameplate. It may NOT be changed.
Connection to the mains should always be made by expert personnel.
The machine should not be started up without proper earth (ground) connection.
Connection to the mains should be through a slow acting safety switch rated at 4A amp (230V) or 10 amp (115V) .

3.3 - Pneumatic connection (SE Version)

For operation of the spindle with pneumatic locking (constant thrust air spring) connect the balancing machine to the compressed air main. The connection fitting is located at the back of the machine. A pressure of at least 7 kg/cm^2 (approx. 0.7 MPa or 7 BAR or 100 PSI) is required for correction operation of the release device.

3.4- Extra safety devices (SE Version)

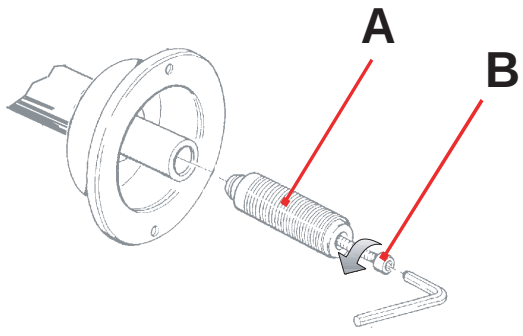
- Wheel always locked even when there is pressure failure during the balancing cycle. Always actuate the unlocking control pedal with the machine stationary in order to avoid stress and abnormal wear on the adapter.

3.5 - Adapter mounting

The balancing machine is supplied complete with cone adapter for fastening wheels with central bore. Other optional flanges can be mounted once the terminal part is removed (also see enclosed brochures)
N.B. : ***CAREFULLY CLEAN THE COUPLING SURFACES BEFORE PERFORMING ANY OPERATION.***

DISMOUNTING THREADED END PIECE

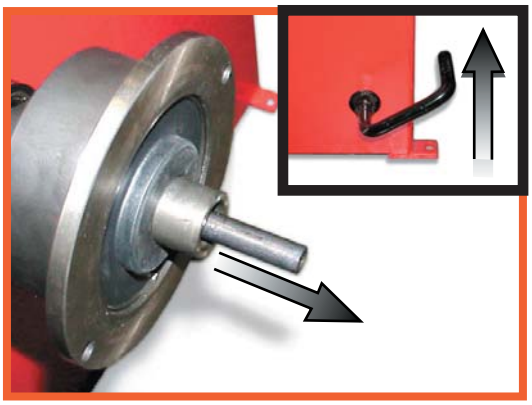
3



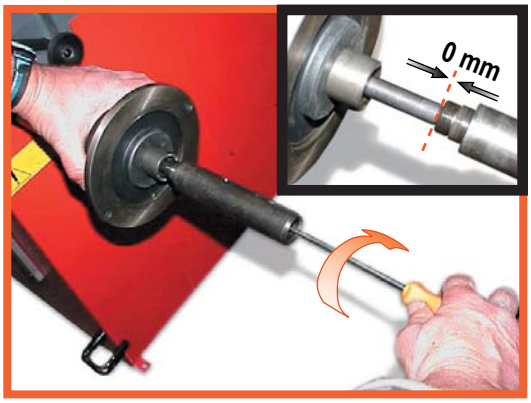
a) Back-off screw B and remove threaded end-piece A.
b) Fit the new adapter.

SE2-Mounting

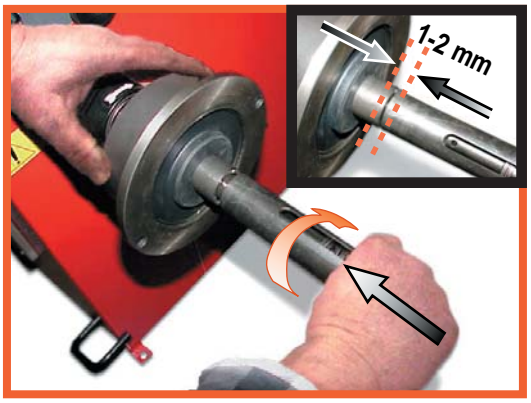
A



B



C



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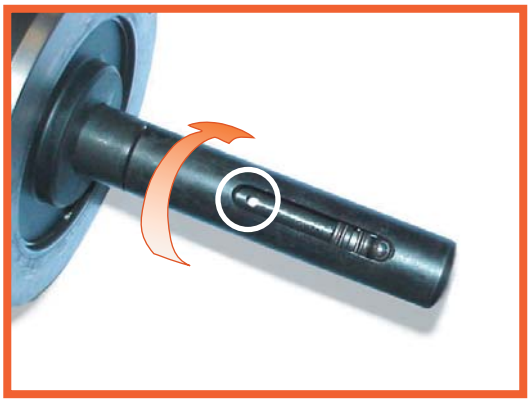
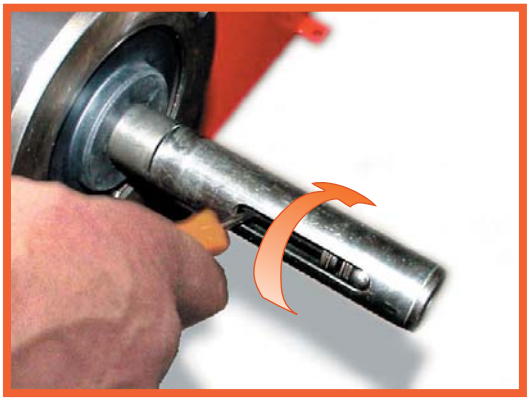
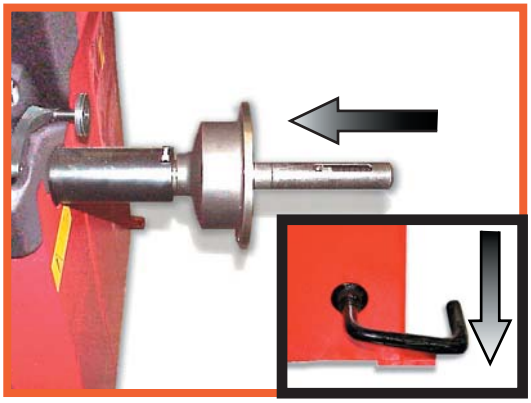


E



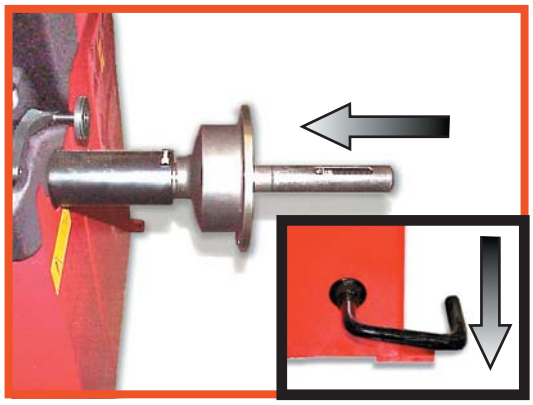
F



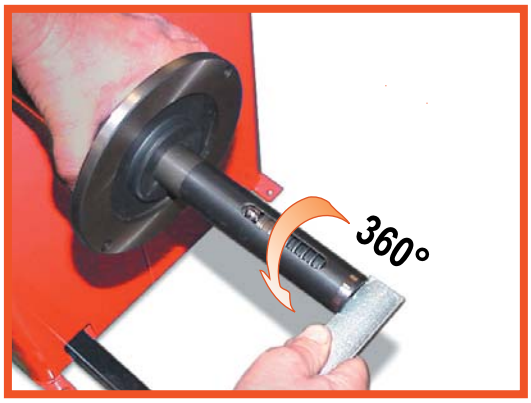
G

SE2-Dismounting

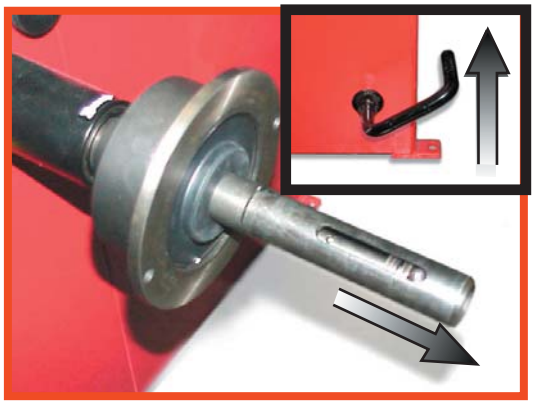
A



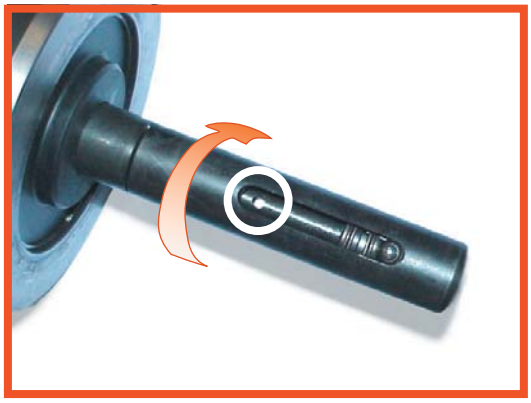
B



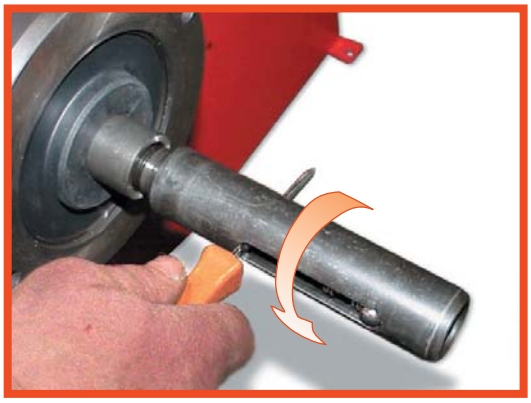
C

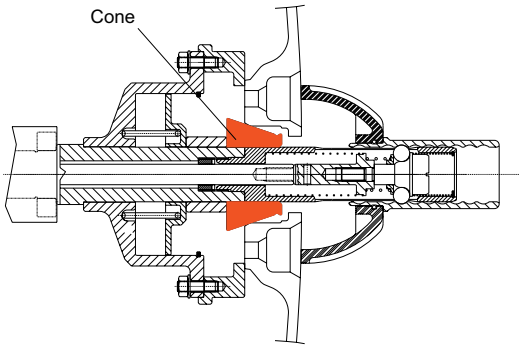


D



E





- Quando possibile, centrare le ruote con cono dall'interno (vedi disegno).
- Evitare di usare il manicotto RL con cerchi di ferro.

- *Whenever possible, centre the wheels with the cone from the inside (see the drawing).*
- *Avoid using the RL sleeve with metal rims.*

- Lorsque c'est possible, centrer les roues avec le cône de l'intérieur (voir dessin).
- Eviter d'utiliser le manchon RL avec les jantes en fer.

- *Wenn möglich, die Räder mit Konus von Innen heraus zentrieren (siehe Zeichnung).*
- *Bei Eisenfelgen die Verwendung der Muffe RL vermeiden.*

- Siempre que sea posible, centrar las ruedas con cono desde dentro (véase dibujo).
- Evitar usar el manguito RL con llantas de hierro.

- *Quando possível, centre as rodas com cone pelo lado de dentro (ver figura).*
- *Evite utilizar a luva RL com jantes de ferro.*

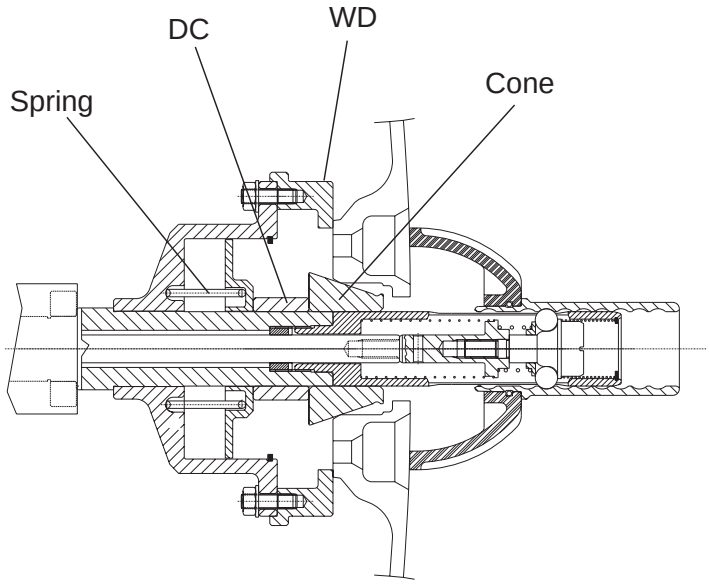
3.6 - Guard mounting and adjustment

a) Fasten the components to the base as illustrated in specific exploded view.
b) The position of the wheel guard when closed can be adjusted with relative screw accessible at the back. Correct position is the one which keeps the tube exactly horizontal with wheel guard closed.
c) Check that the microswitch is held down when the guard is closed.
d) Adjust the angular position of microswitch control.

3.7 - Spacer WD

When balancing very wide wheels (9”), there is not enough space to turn the distance gauge. To withdraw the wheel from the machine side, fit spacer WD on the adapter body and secure it with the standard issue nuts. When centring the wheel with the cone on the inside, fit the other cone as a spacer to obtain spring thrust.

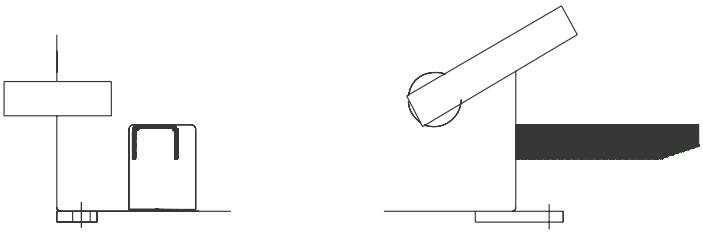
4



4 - Controls and components

4.1 - Brake pedal

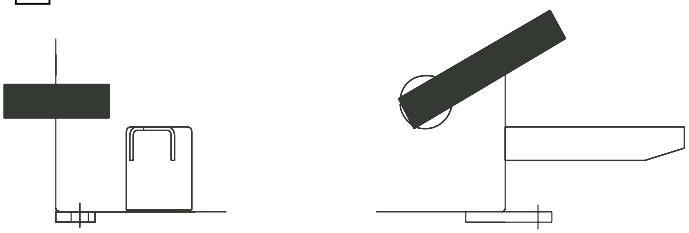
5



This pedal allows the operator to hold the wheel when fitting the counterweights. **It must not be actuated during the measuring cycle.**

4.2 - Pneumatic locking pedal (SE Version)

6



This pedal allows releasing the device fastening the wheel on the adapter. **Do not actuate this pedal during the machine cycle and/or when adapters other than the standard cone adapter are mounted.**
The pedal has two stable positions: top, wheel unclamped; bottom, wheel clamped.

4.3 - Automatic distance and diameter gauge

This gauge allows measurement of the distance of the wheel from the machine and the wheel diameter at the point of application of the counterweight. It also allows correct positioning of the counterweights on the inside rim by using the specific function (see ***INDICATION OF EXACT CORRECTION WEIGHT POSITION***) which allows reading, on the monitor, the position used for the measurement within the rim (For calibration, see the corresponding section).
The gauge can only be used with the counterweight pincers mounted.

4.4 - Automatic width gauge (optional)

Width gauging is through a SONAR device which measures the distance of the wheel without mechanical contact, merely by closing the guard and each time a valid measurement has been made with gauge ***AUTOMATIC DISTANCE AND DIAMETER GAUGE***.

4.5 - Automatic wheel positioning

At the end of the spin, the wheel is positioned according to the unbalance on the outside or else according to the static unbalance (when selected).
Accuracy is ± 20 degrees.

4.6 - Clock control

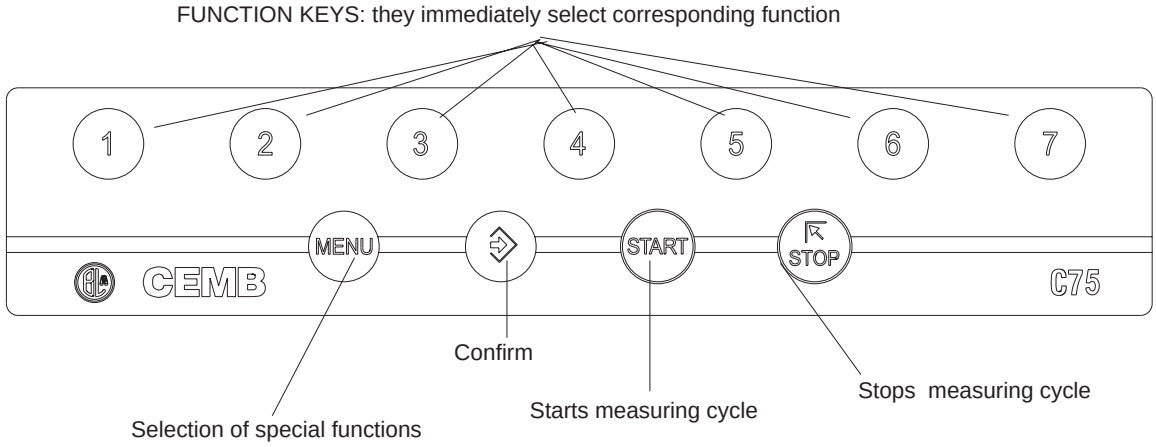
The wheel balancer is provided with a clock having a back-up of about one month with the machine switched off. If the machine remains off for a long period, at the first switch on, check the date and time (see ***CLOCK SET-UP***), adjusting them if necessary.

4.7 - Printer (option)

Used to print useful information for the vehicle, residual imbalance and eccentricity for the balanced tyre.

4.8 - Keyboard

7



N.B. - Press the buttons with the fingers only: never use the counterweight pincers or other pointed objects.

- When the beep signal is enabled (see section *ACOUSTIC SIGNAL*), pressing of any push button is accompanied by a "beep".

5 - Indications and use of the wheel balancer

The monitor shows several information and suggests various alternative ways of use to the operator.
This is through various “screens”.

5.1 - Initial screen

Buttons enabled

MENU : main functions screen (see ***MENU ACCESS DIAGRAM***)

2 **:** selecting static correction

START : balancing spin (see ***RESULT OF MEASUREMENT***)

Dimensions gauge: when extracted, the Dimensions screen is selected (see ***PRESETTING OF WHEEL DIMENSIONS).***
If the machine remains on the initial screen for a certain amount of time without being used, the system is automatically switched to a screen-save. Striking of any key, movement of the wheel of distance + diameter gauge will cause automatic switching from the screen-save menu to the initial screen.

5.1.1 - Screen-save screen

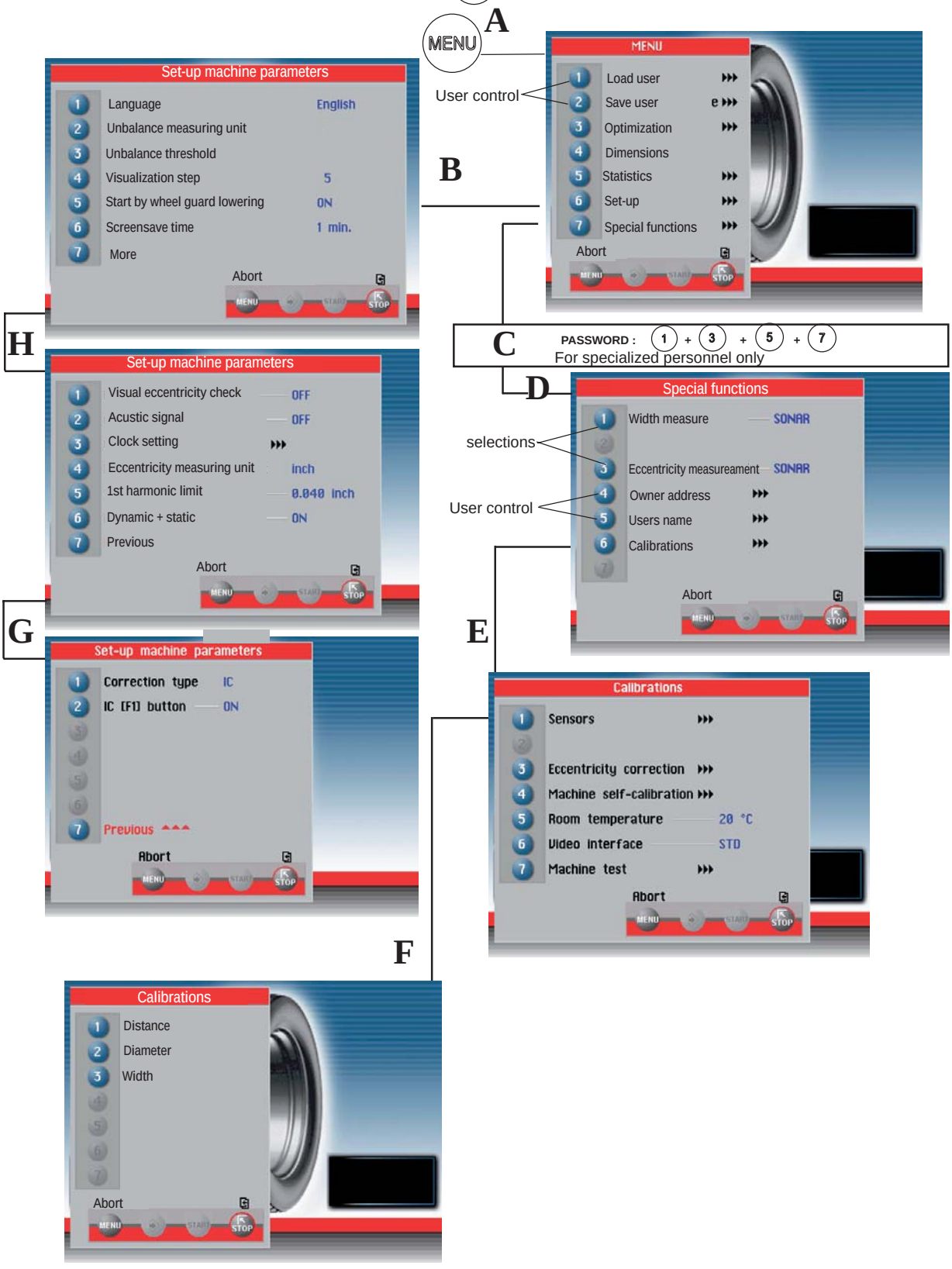
N.B.: Name of the wheel balancer’s owner. Can be preset via the monitor.

5.2 - Menu access diagram

N.B. : - The symbol ▶▶▶ indicates the presence of a further menu.

- To return to the previous menu, press button STOP

- To return to the initial screen, press button MENU

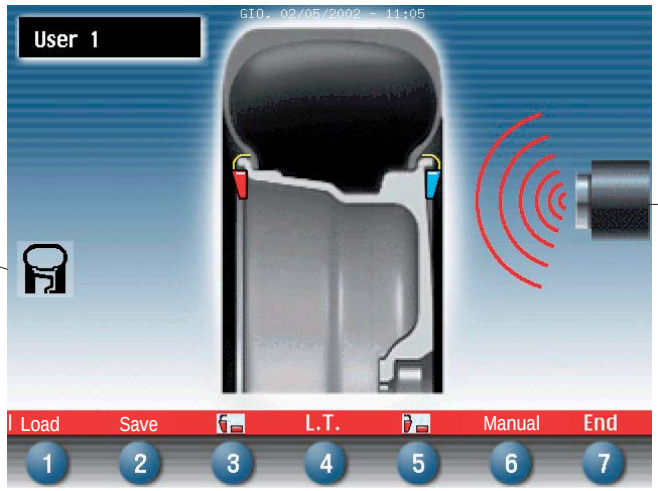


5.3 - Presetting of wheel dimensions

5.3.1 - Automatic presetting (see also ***CORRECTION MODE***)

5.3.1.1 - Standard wheels

INDICATOR
L.T. function enabled
(see Buttons
Enabled)



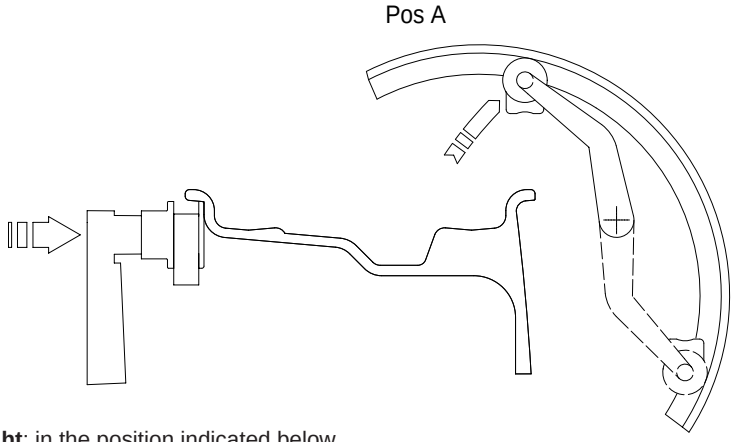
INDICATOR: Width
Sonar function
enabled

The screen appears upon removing the distance + diameter gauge.
The "dimension acquired" message is indicated by the correction weight symbol, which changes from blue to red.

- INNER SIDE WEIGHT: Using the special grip, move the end of the gauge against the rim in position:

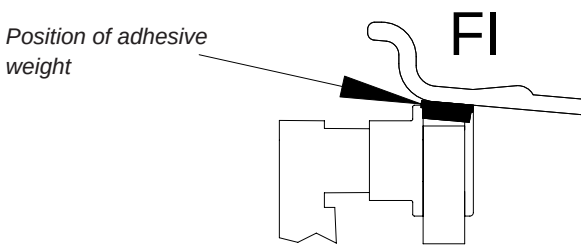
a) **Sprung weight** : in one of the positions A/B indicated in figure 8.

8



b) **Adhesive weight**: in the position indicated below

8a

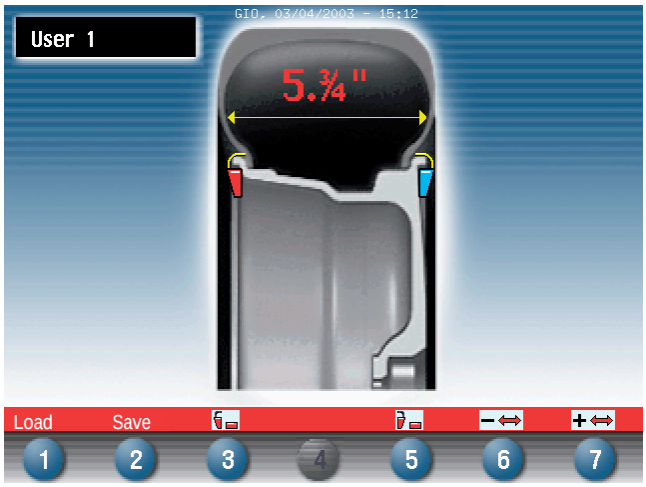


Note: Always use the round part of the striker plate.

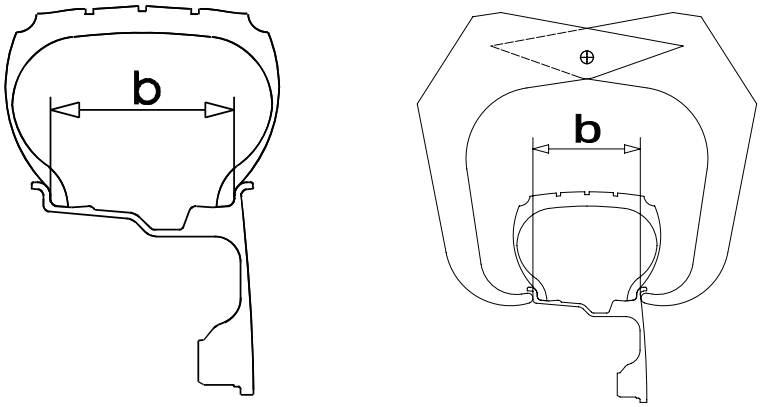
- Hold the gauge in position for at least 2 seconds.

If the acoustic signal is enabled (see ***ACOUSTIC SIGNAL***), the acquisition of the dimensions is accompanied by a "beep".

Set the distance+diameter gauge to the rest position.
The current width value is displayed inside the tyre.



6 / 7 - Set the nominal width, which is normally shown on the rim, or measure the width “b” with the caliper gauge provided.



The other enabled buttons are:

3 / 5 Select the type of weight to apply (see CORRECTION METHODS).

1 / 2 User call/save control.

STOP Return to initial frame.

START Launch balancing.

5.3.1.2 - Automatic width measurement (optional)
Gradually lower the guard after carrying out measurement of distance + diameter in automatic mode.
If the width measured is incorrect (out of range), the following message appears:

“Sonar measure is out of range:”
“F1 = repeat”
“F2 = manual set-up”

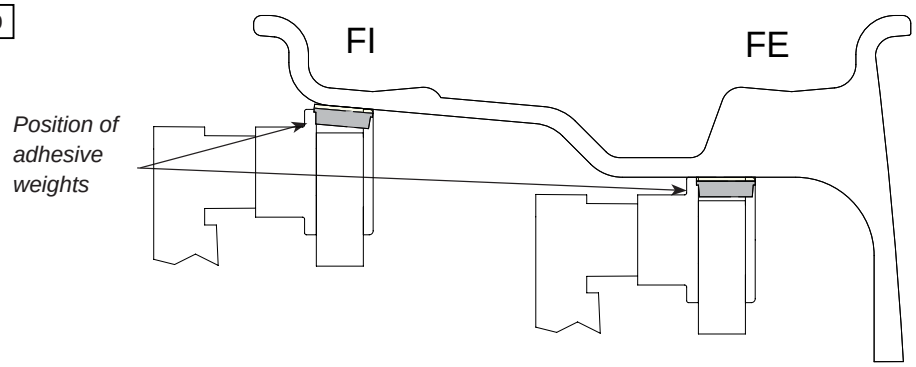
Press F1 to re-lower the guard and repeat the width measurement. Press F2 to go to the dimensions panel for manual insertion of the width measurement.
Manually presetting is possible by using the push buttons as described in ***MANUAL PRESETTING.***

5.3.1.3 - Wheels ALUS

After the measurement performed for the FI inner side, as indicated in fig. 9, pull out the gauge again to store the data for the FE outer side; choose position A or B (fig. 8) at your choice. Keep this position for at least 2 seconds. The counterweight symbols change colour.

When the acoustic signal is enabled (see ***ACOUSTIC SIGNAL***), the acquisition is accompanied by a “beep”.

9



After having detected the dimensions, use the (3) key to indicate the type of correction selected for the inner side.

The following buttons are enabled:

(1) / (2) Management of save user recall

(3) Selection of clip or adhesive weight for inside.

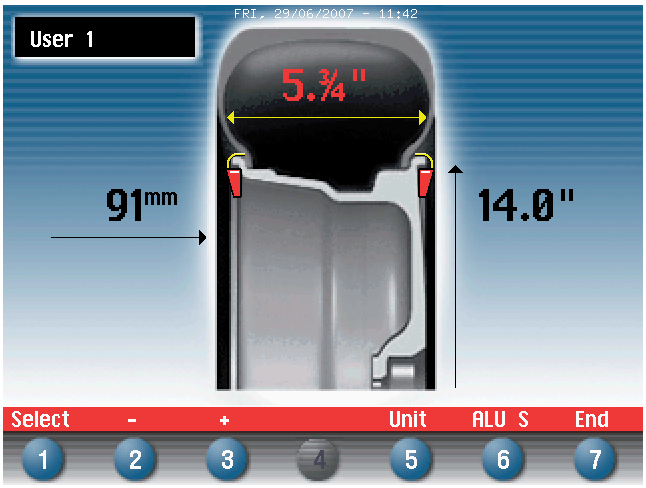
(4) Only for automatic width option:
The **L.T.** key (**LIGHT TRUCK**) used to improve the dimensional calibration of large-diameter wheels such as off-road, trucks, wheels which protrude significantly from the rim. Press the **L.T.** key, after distance measurement, immediately before lowering the guard for Width Measurement.
The option is disengaged at the end of current Width Measurement.

(6) Selecting the manual dimension presetting screen

(7) / (STOP) Return to initial screen.

(START) Balancing run.

5.3.2 - Manual presetting



If necessary, the dimensions can be inserted or edited in manual mode as follows:

- press MENU + 4 .

- press 1 to select the dimension to be preset (red).

- press 2 / 3 to preset the required value.

- press 5 to change unit of measurement.

- press 6 to preset the dimensions for the ALUS correction mode

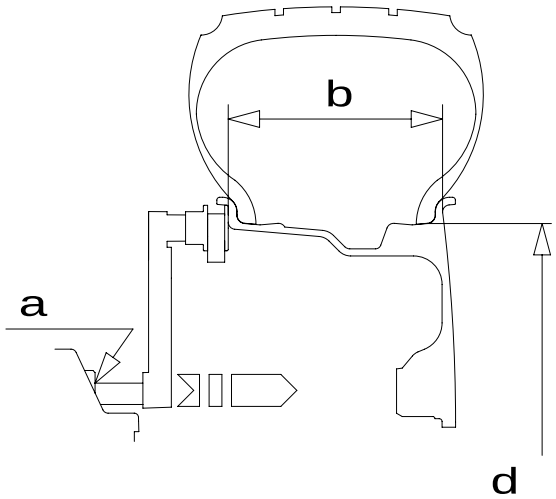
Definition of dimensions for correction using spring weights:

d = DIAMETER: Preset the nominal diameter stamped on the rim.

b = WIDTH: Preset the nominal width indicated on the rim (see ***STANDARD WHEELS***) .

a = DISTANCE: Preset the distance of the inside of the wheel from the machine, after measuring it with relative gauge as described in fig. 8.

10



In the event of correction type other than standard (spring weight), follow the instructions on the screen for correct detection of dimensions.

5.4 - User control

The wheel balancer can be used simultaneously by 4 different users who, through a simple sequence, can memorize their work condition and call it when needed. The users' names can be memorized (***PRESETTING THE CUSTOMER AND USER NAME).***

5.4.1 - User memorization

- Preset the dimensions correctly according to the procedures already described in sections ***AUTOMATIC PRESETTING***.

- Press (MENU); the "MENU" window appears on the monitor.

- Press (2); a window appears with the list of available USERS. The current user is displayed in red.

- Press the number corresponding to the required USER. The system returns to the initial screen automatically.

5.4.2 - To call user

- Perform a measuring spin with any dimensions.

- Press button (MENU); the "MENU" window appears on the screen.

- Press (1) : a window appears with the list of available USERS. The current user is displayed in red.
- Press the number corresponding to the required USER. The system automatically returns to the initial screen with recalculation of the unbalance values on the basis of the effective dimensions of the USER called.

N.B. **- The dimensions memorized as USER are lost when the machine is switched off.**
- The USER control is also valid for the ALUS dimensions.
- The current USER is always displayed in the Measurements and Dimensions screens.

5.5 - Result of measurement

After performing a balancing spin, the unbalance values are displayed as well as arrows useful for positioning the point of application of the correction weight. After positioning the wheel, apply the weight in the 12 o'clock position. When the beep signal is enabled (see section ***ACUSTIC SIGNAL***), reaching of the correction position is accompanied by a "beep".
If the unbalance is less than the chosen threshold value, the "OK" appears instead of the unbalance value to indicate, on that particular side, the wheel is in tolerance; the residual unbalance can be displayed by pressing button (1) with an accuracy of 0.5 g (0.1 oz).

The following buttons are enabled:

(1) Display of residual unbalance

(2) Selection of correction mode (STATIC/DUAL SURFACE). When the mode is changed, the unbalance values are recalculated automatically on the basis of the previous spin.
Simultaneous display of the dynamic+static unbalance can be enabled through the special function in Setup (see par. DYNAMIC + STATIC).

(3) Prints the balancing certificate (option)

(4) **:** Eccentricity measurement graph (OPTIONAL).
N.B : 1. The symbol above the key is flanked by the symbol ⚠ if the eccentricity of the first harmonic exceeds the limit set in the setup parameters (First harmonic limit).
2. When this push button is held down for more than 1.5 seconds, eccentricity measurement is temporarily disenabled (enabled in GENERAL SETUP).
To re-enable eccentricity measurement, press push button [4] again for more than 1.5 seconds. Every time the machine is switched on, the status of eccentricity measurement reflects the settings in GENERAL SETUP.

(6) Split control for splitting of unbalance over presettable components (***"SPLIT" CONTROL***). Button only enabled in STATIC or ALUS correction.

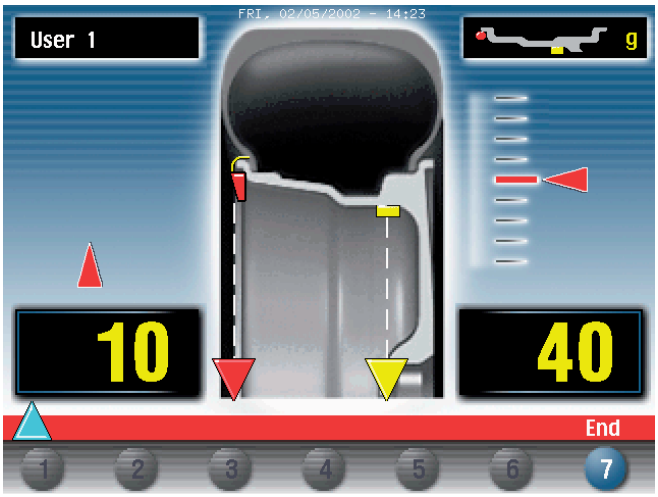
(7) Indication of the longitudinal position of the unbalance (***INDICATION OF EXACT CORRECTION WEIGHT POSITION***) is enabled.

(MENU) For selection of special functions

(START) Balancing spin.

N.B. If the machine remains on this screen without being used for more than the time preset in the Setup parameters (6), the screen automatically returns to the screen-save.

5.5.1 - Indication of exact correction weight position



It is possible use this function in the event of correction of the external side using an adhesive weight placed inside the rim. Remember to thoroughly clean the application areas.
This function allows cancelling approximations in the mounting of counterweights with consequent reduction of the residual unbalance.

- Press button (7) from the Measurements screen.

- Pull out the rim distance+diameter gauge **in position A, figure 8**. Approach of the weight to the correction position is indicated by a moving coloured arrow [△].
- When a fixed arrow [▽] is reached, rotate the wheel to correction position (FI or FE) and apply the counterweight by turning the tip of the gauge towards the outside, into the position **in which the pincers touches the wheel.** Compensation is made for the fact that the weight application position is no longer at 12 o'clock (where appropriate use the weight pusher) (fig. 11).

When the acoustic signal is enabled (see ***ACOUSTIC SIGNAL***), the reaching of a fixed arrow [△] is accompanied by a "beep".

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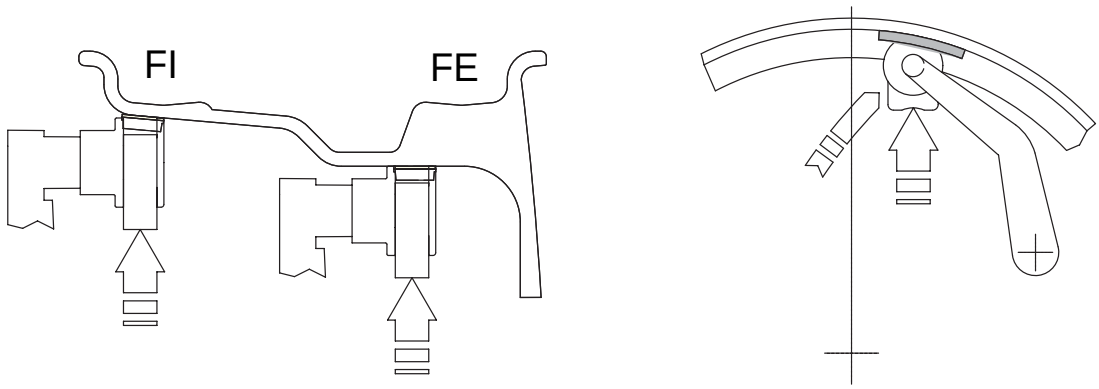
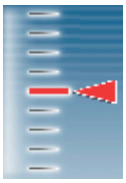


5.5.2 - “SPLIT” control

SPLIT is only possible in the event of static unbalance or ALUS external side and is used to hide any adhesive weights correcting unbalance behind the rim spokes.

To split the unbalance detected in two different positions, proceed as follows :

1. Position static unbalance or ALUS external side in the correction position :



2. Select a spoke close to the 12 o’clock postion to be corrected, more it into the 12 o’clock position and press button [6].
3. Turn the wheel in the rotation direction indicated on the unbalance display, brining the second spoke to the 12 o’clock position and press button [6].

- Turn the wheel in direction of rotation.

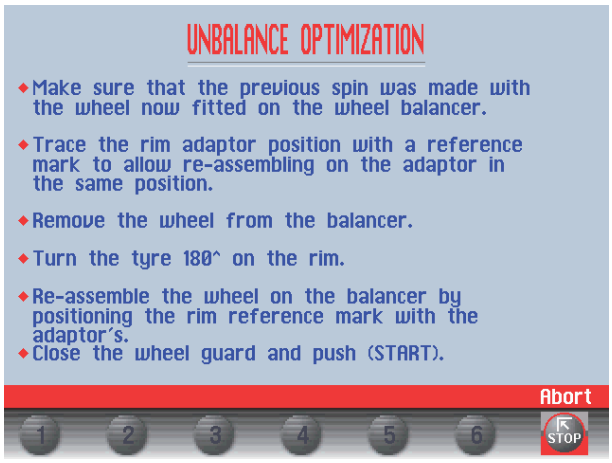
- Turn the wheel in reverse direction of rotation.

4. At this stage, the screen shows the graphic display of the correction spokes with the relative weight of the unbalance detected.
5. Position the spokes indicated on screen in the 12 o’clock position and correct with the value displayed.

Any error in this procedure is clearly shown on screen.
Always follow the information provided by the wheel to optimise correction.

Note: When SPLIT is enabled, the icon appears on the left of the screen.

5.5.3 - Unbalance optimization

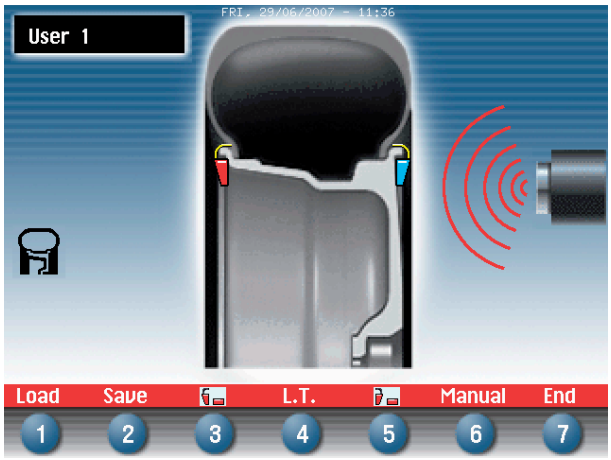

UNBALANCE OPTIMIZATION
Make sure that the previous spin was made with the wheel now fitted on the wheel balancer.
Trace the rim adaptor position with a reference mark to allow re-assembling on the adaptor in the same position.
Remove the wheel from the balancer.
Turn the tyre 180^ on the rim.
Re-assemble the wheel on the balancer by positioning the rim reference mark with the adaptor's.
Close the wheel guard and push (START).
Abort
1
2
3
4
5
6
STOP

The symbol is displayed automatically for static unbalance exceeding 30 grams (1.1 oz). The program allows reducing the total unbalance of the wheel by compensating, when possible, the unbalance of the tyre with that of the rim. It requires two spins with rotation of the tyre on the rim in the second spin.

Press (MENU) + (3) after a first spin and follow the instructions appearing on the monitor.

5.5.4 - Correction mode

After having performed automatic measurement of the inner side, it is possible to place the correction weights as required by pressing pushbuttons (3) and (5).



N.B.: *In the event of automatic measurement of both sides, if the difference between the inner and outer diameters is greater than or equal to 2", the system sets the inner side spring weight. To modify this presetting, press the (3) button. The external side may only be "adhesive".*

To display static unbalance, press the (2) button on the measurement screen (for ALUS static, the inner side diameter is always considered).

Possible types of correction:

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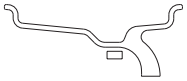
Balancing of steel or light alloy rims with application of clip-on weights on the rim edges



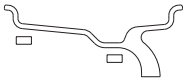
The STATIC mode is necessary for motorcycle wheels or when it is not possible to place the counterweights on both sides of the rim.

Balancing of light alloy rims with application of adhesive weights on the rim shoulders.

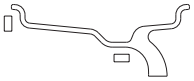
Combined balancing: adhesive weight on the outside, clip-on weight inside.

Combined balancing: clip-on weight outside and adhesive weight inside.

ALU S :

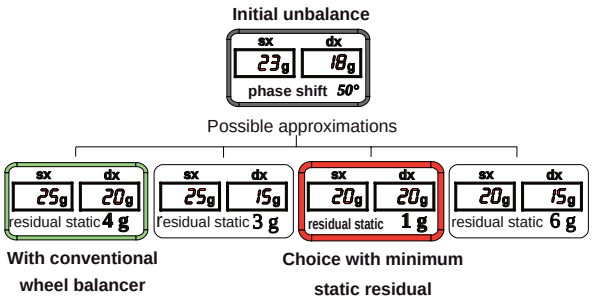


Balancing of alloy rims with hidden application of the adhesive weight on the outside.



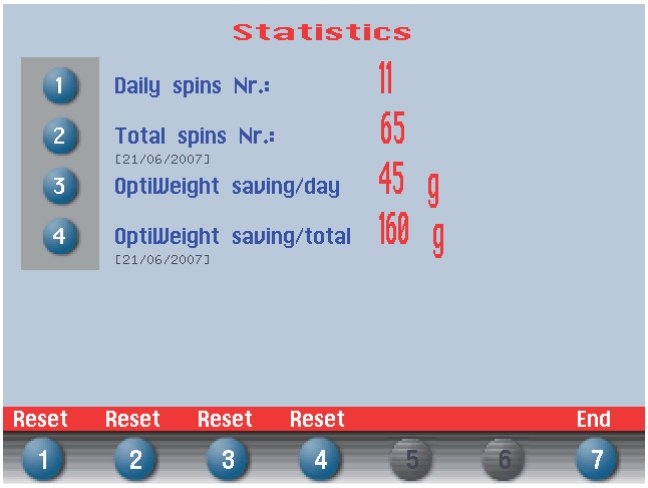
Combined balancing: clip-on weight inside and adhesive hidden weight outside (Mercedes).

5.5.5 - Automatic minimization of static unbalance



This program is designed to improve the quality of balancing without any mental effort or loss of time by the operator. In fact by using the normal commercially available weights, with pitch of 5 in every 5 g, and by applying the two counterweights which a conventional wheel balancer rounds to the nearest value, there could be a residual static unbalance of up to 4 g. The damage of such approximation is emphasized by the fact that static unbalance is cause of most of disturbances on the vehicle. This new function, resident in the machine, automatically indicates the optimum entity of the weights to be applied by approximating them in an “intelligent” way according to their position in order to minimize residual static unbalance.

5.6 - Statistics



DAILY N° OF RUNS:
Indicates the number of runs performed as from switching on the machine.
Such parameter is automatically reset after switching the machine off.

TOTAL N° OF RUNS:
Indicates the number of runs starting from the date indicated in square brackets.
This parameter remains memorized even when the machine is switched off.

DAILY WEIGHT SAVED
Indicates the weight saved when using the IC instead of the standard correction method from the moment the wheel balancer is turned on. This parameter is automatically reset after turning off the machine.

TOTAL WEIGHT SAVED
Indicates the weight saved when using the IC instead of the standard correction method from the date indicated in square brackets. This parameter remains memorized even when the machine is switched off.

The following buttons are enabled:

1 / 2 / 3 / 4 : Press to reset the relative counter.
For the TOTAL counters a correct password must be entered.

6 : Prints some statistical values (optional)

STOP : To return to the previous screen

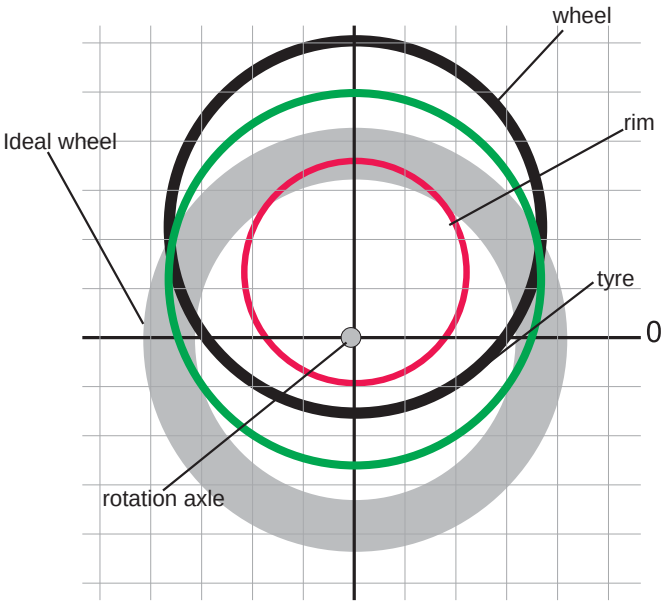
MENU : to return to the measurement screen

5.7 - When and why matching

The C75 software associated with eccentricity measurement is a powerful tool for determining the need to perform relative rotation between the rim and tyre in order to reduce the eccentricity of the wheel down to acceptable limits. The principle adopted is based on the consideration that a rim with acceptable tolerance, mounted with an acceptable tyre, can statistically generate a total eccentricity which is not acceptable but can be improved by matching.

Generally speaking, rim measurement is not necessary, accurate or useful because:

- To measure the rim it is necessary to remove the tyre. There can by coarse errors on the outside (e.g. aluminium wheels!)
- The two rim sides can be eccentric in a very different way. Therefore to which one to make reference? What is the effect on the tyre mounted?
- To improve the eccentricity of a wheel, **the rim should be eccentric**, to compensate the tyre. And viceversa.
- If after a rotation by 180° of a wheel, the value is still out-of-tolerance, either the tyre or rim are too eccentric: One of the two must be replaced!



Example 1

Rim + 0.8 mm

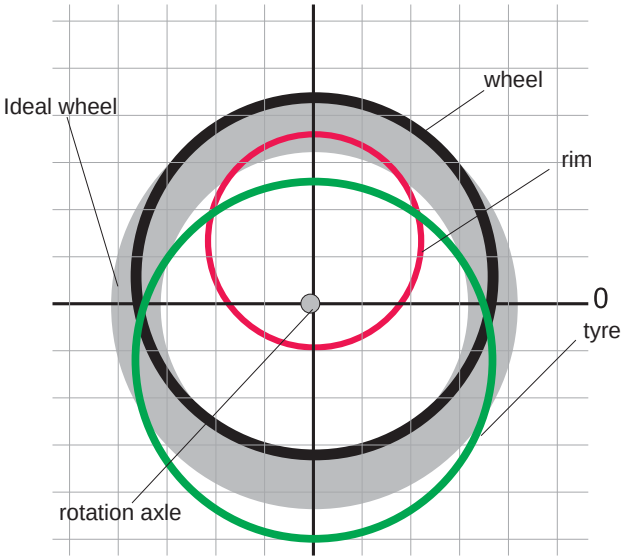
Tyre + 0.6 mm

Wheel + 1.3 mm

Eccentricity of the wheel is excessive, due to an acceptable rim or tyre but randomly placed in an "unfortunate" relative position.

SOLUTION:
Rotate the tyre on the rim by 180°

RESULT:
wheel eccentricity 0.3 - 0.4 mm (in tolerance)



Example 2

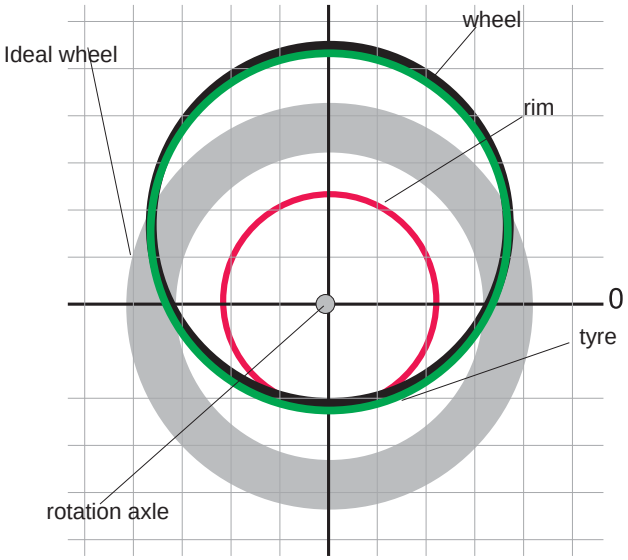
Rim + 0.8 mm

Tyre - 0.6 mm

Wheel + 0.3 mm

Eccentricity of the single items has been compensated.

The wheel is acceptable.



Example 3

Rim 0 mm

Tyre + 1.2 mm

Wheel + 1,2 mm

Eccentricity of the wheel cannot be compensated by the rotation because the rim is perfect!

SOLUTION:
Rotate the tyre on the rim by 180°

RESULT:
no improvement is obtained

5.7.1 - Presetting of tolerance on the machine
There is no general rule concerning acceptability of an eccentricity value . As a first approximation we consider it correct to use a threshold of 1 to 1.5 mm. The E/ECE/324 standard prescribes 1.5 mm as max. eccentricity of a rebuilt tyre.

5.7.2 - Value of static unbalance, correlated with eccentricity
Clear indication is given in the Measurement screen of both the value and position of the static unbalance as well as the eccentricity. In fact, it is interesting to check the correlations of the two values, above all of the two positions. When the two positions have a similar angle (± 30° one from the other), there is a **clear sign that an eccentricity is present which can be compensated by matching.**

5.7.3 - Value of unbalance corresponding to eccentricity
For user's reference, the centrifugal force is calculated corresponding to a certain speed, compared to the force generated by the eccentricity present on the tyre (calculated with an approximate average elastic constant).

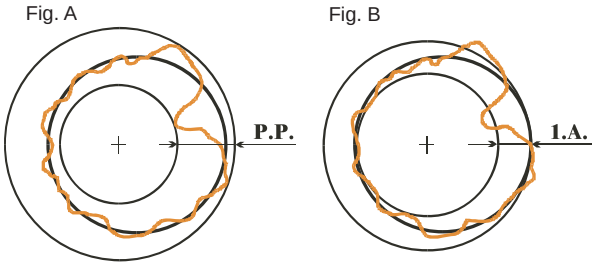
5.8 - Eccentricity measurement (optional)

The much enlarged figures show the outer tyre surface and axis of wheel rotation.

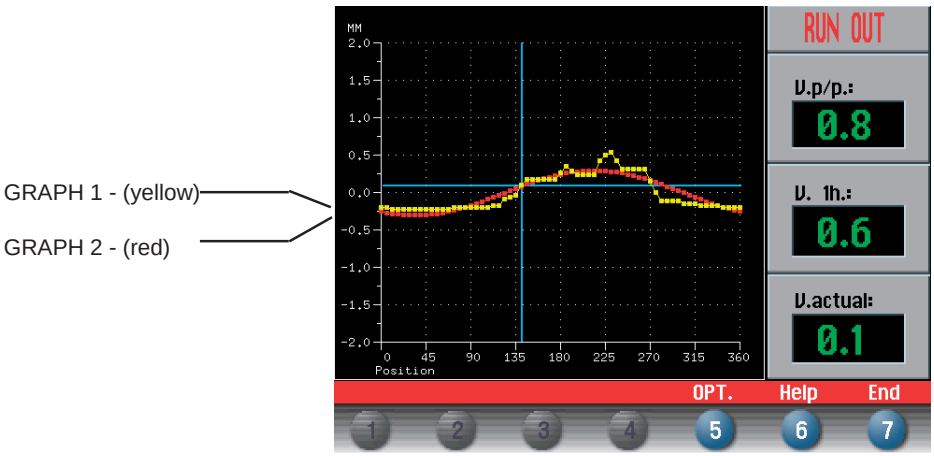
Fig. A - shows measurement of the total Peak-to-Peak eccentricity defined as maximum radial deviation of the tyre surface.

Fig. B - shows measurement of the eccentricity of the 1st harmonic, i.e. the eccentricity of that circle which "recopies" the tyre shape, by averaging the local deviations of the tyre from the round shape.

Obviously the P.P. measurement is normally greater than that of the 1st harmonic. Tyre manufacturers normally supply two different tolerances for the two eccentricities.



At the end of the balancing spin it is possible to automatically measure the eccentricity of the tyre through the SONAR sensor installed on the guard. The sensor should be positioned by hand in front of the tyre tread.
GRAPH 1 : represents the actual Peak-to-Peak eccentricity.



GRAPH 2 : represents the eccentricity of the 1st harmonic. For a wheel in optimum conditions, such graph should approach a straight line.
While rotating the wheel, the screen cursor indicates the current value, with the stage referred to the eccentricity measurement sensor.

The following buttons are enabled:

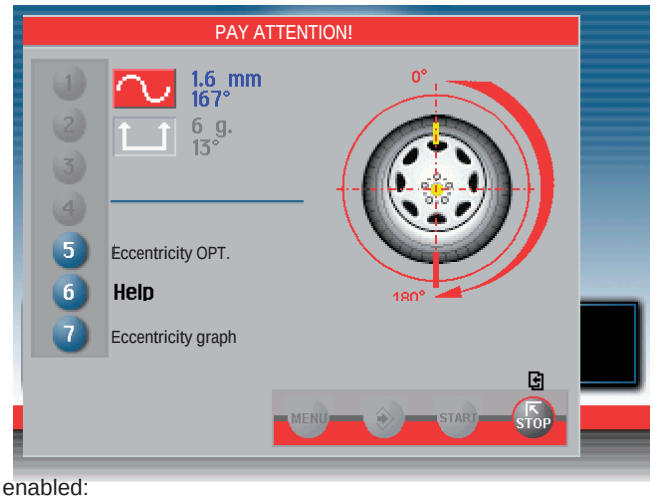
(3) : Prints the first harmonic eccentricity value (option)

(5) : Start an eccentricity optimisation procedure (see ***ECCENTRICITY OPTIMISATION)***.

(6) : A box is displayed indicating the offset effect that that eccentricity of the first harmonic measured may have, at an average speed of 120 Km/h.

(7) : Return to measurement screen.

N.B.:
In the event that the value of the first harmonic is higher than the limit indicated in the setup parameters (see ***FIRST HARMONIC LIMIT***), at the end of eccentricity measurement the following window appears:



The following buttons are enabled:

5 : Start an eccentricity optimisation procedure (see ***ECCENTRICITY OPTIMISATION).***

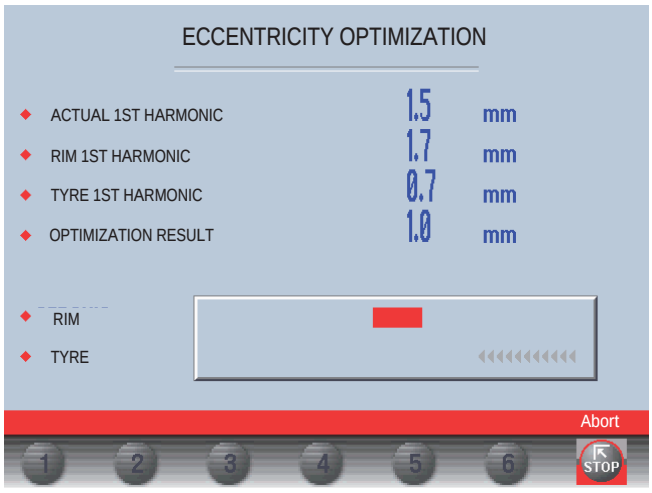
6 : A box is displayed indicating the offset effect that that eccentricity of the first harmonic measured may have, at an average speed of 120 Km/h.

7 : Select the display box of the graph for the eccentricity measured (see ***ECCENTRICITY MEASUREMENT (OPTIONAL)***.

STOP : Return to measurement screen.

5.8.1 - Eccentricity optimisation
This procedure is used to assess the possibility of adequately rotating the tyre on the rim in order to minimise wheel eccentricity.
Eccentricity optimisation, in general, is advised for values of the first harmonic higher than 1.2 mm.

Follow the simple on-screen instructions. At the end, the following is displayed:



Mark the rim and the tyre in the positions indicated on screen and move the tyre on the rim until the marks coincide.

3 : Prints the eccentricity values read (option)

STOP : Return to measurement panel.

N.B.: All the eccentricity measurement values can be displayed in INCHES by selecting this option from the setup parameters (see *ECCENTRICITY UNIT OF MEASURE*).

6 - Setup (see *Diagram showing access to the menus*)

The Setup screen provides the user with many possibilities required for presetting the machine according to his own requirements. Such settings remain unaltered even when the machine is switched off.
The following buttons are enabled:

STOP : return to previous window

MENU **:** return to Measurement screen

from 1 to 7 : for selection of the parameter.

6.1 - Language

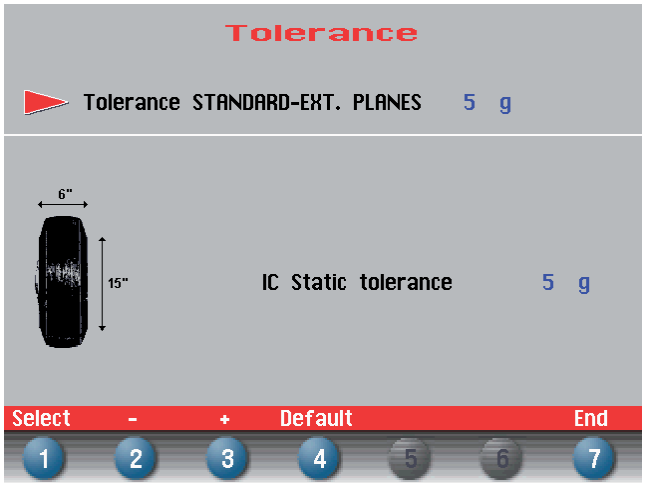
This function allows selecting the language to be used for displaying descriptive and diagnostic messages regarding machine operation.

6.2 - Unit of unbalance measurement

It is possible to select whether to display the unbalance values expressed in grams or ounces.

6.3 - Tolerance (also see *CORRECTION METHOD*)

This is the unbalance threshold below which the word “OK” instead of the unbalance value appears on the screen at the end of the spin:



The tolerance varies based on the correction method selected.
In the case of IC (Intelligent Correction), set the static tolerance limit and the average weight of a reference wheel of 6” in width and 15” in diameter.

The following buttons are enabled:

1	parameter selection during setting
2 / 3	parameter decrease/increase during setting
4	default parameter setting recommended by the manufacturer
7	return to previous frame.

6.4 - Unbalance display pitch
This represents the display pitch of the unbalance and varies according to the unit of measurement selected. The selection “5 g” (1/4 oz) enables display of the correction values on both sides such as to bring the static unbalance to 0 (theoretical). It is recommended to preset this function as standard use of the machine as it improves the balancing quality. The computer makes a complex calculation which allows cancelling the residual static unbalance by varying the value and position of the counterweights fixed in steps of 5 grams (1/4 oz).

6.5 - Spin with guard closed
When “ON” is selected the automatic start of the spin is enabled when the guard is closed.

6.6 - Screen-saver time
When the machine remains unused for longer than the time preset with this function, the processor automatically returns to the Initial screen. Preset the time in seconds.

6.7 - Visual eccentricity check
At the end of wheel acceleration, as soon as the motor is disengaged, the guard can be opened for visual control of any wheel eccentricity as the rotation speed gradually drops.
Do not strike the wheel during the entire deceleration stage; to brake the wheel, close the guard. However, avoid using the brake as far as possible because this may compromise unbalance measurements. The unbalance values measured are only displayed when the wheel has come to a standstill.
This function is active for only one machine run.

6.8 - Acoustic signal
When “ON” is selected, the sending of an acoustic signal (beep) is enabled in the following cases:
- when any push button is pressed;
- when dimensions are acquired in automatic mode;
- when the correct angular position for weight application is reached in the Measurement screen;
- when the correct angular position for weight application is reached in the Position Repeater screen.

6.9 - To set the clock
Serves for correct setting of the date and time: follow the instructions on the screen.

6.10 - Eccentricity unit of measure
You can select to display the results of the eccentricity measurement in millimetres or inches.

6.11 - First harmonic limit
The first harmonic limit beyond which it is felt suitable to rotate the tyre on the 180° rim. Recommended Limit = 1.2 mm/ 0.05 inch. If a 1st harmonic higher than the set limit is measured, a window appears on screen to indicate the need to rotate the tyre of the rim.

6.12 - Dynamic + Static
You can select to simultaneously display the dynamic and static unbalance values. In this case, a small window always appears on the left of the screen displaying the static unbalance with a step of 1 gram / .1 ounce.

6.13 - Correction method

One of the three possible correction methods can be selected based on the specific requirements of the customer.

6.13.1 - Standard correction method

The wheel balancer considers the unbalance within tolerance when the value of each single plane is lower than the tolerance set.

6.13.2 - External plane correction method

If correcting with adhesive weights, the unbalance is considered within tolerance when the recalculated external plane weight (clip-on weights) is lower than the tolerance set.
Additional windows appear on the screen always displaying the residual external plane value (clip-on weight):

6.13.3 - IC (intelligent correction) correction method

The correction plane unbalance is considered within tolerance when both the STATIC and the DYNAMIC TORQUE unbalances are lower than the tolerance set.
This correction method allows considerably reducing the weight to be applied, yet maintaining excellent balancing quality. An icon appears on the screen showing the value of weight saved with respect to standard balancing.

If a special icon appears near the button

, it means that the wheel balancer is suggesting static balancing, however, such that also the dynamic torque unbalance will be brought within tolerance.

When pressing the button

, the position repeater frame is accessed which clearly indicates where the weight should be positioned in the rim.

NOTE: The innovative IC software has been designed to reduce the amount of weight used to correct the unbalance, leaving a residual unbalance on the wheel within the set tolerances.
The tolerance used by the machine is obtained from a tolerance of a reference wheel, modified in order to make the vibration generated by the reference wheel comparable with that in use.
This is obtained according to the coded theory of the ISO standards.
In general, a wheel balanced using IC has a higher residual unbalance than a wheel balanced at best using the conventional method, but, although generating a tolerable vibration from the vehicle, it has the advantage of considerably reducing the counterweights used.

6.14 - F1 for I.C.

In the case of the I.C. correction method, when this function is set to ON it allows:
displaying the unbalance correction values with an approximation of 1g/0.1 ounce.

- Caution -

7 - Special calibrations and functions (see ***MENU ACCESS DIAGRAM***)

In order to gain access to the “Reserved Calibrations and functions” it is necessary to enter a password.
Any incorrect operation within the functions described below could impair the operation of the wheel balancing machine. Unauthorized use will cause cancellation of the warranty on the machine.

7.1 - Enabling of width measurement

This function enables/disables automatic width measurement with SONAR or contact device; always select “SONAR”.

7.2 - Presetting the customer and user name

The machine can be customized by presetting:
a) The name appearing on the Initial screen (screen-save).
b) The name of 4 different machine users (USER NAME).
An “ideal” keyboard appears on the monitor with the set of characters available for composition of the wordings.
The Customer’s name consists of three lines, each max. 30 characters.
The USER NAME consists of a wording max. 15 characters.

7.3 - Enabling of eccentricity measurement

Enables/disables measurement of the tyre eccentricity during an unbalance measurement spin.

7.4 - Calibrations

When 6 is pressed from the Special Functions menu, access is gained to the Calibration menu.

7.4.1 - Gauge calibration

Select the gauge to be calibrated and follow the instructions appearing on the monitor.
N.B.:
- In the width gauge calibration it is necessary to enter one dimension which can be measured as follows:

A - GAUGE “ZERO” DISTANCE
SONAR “ZERO” DISTANCE

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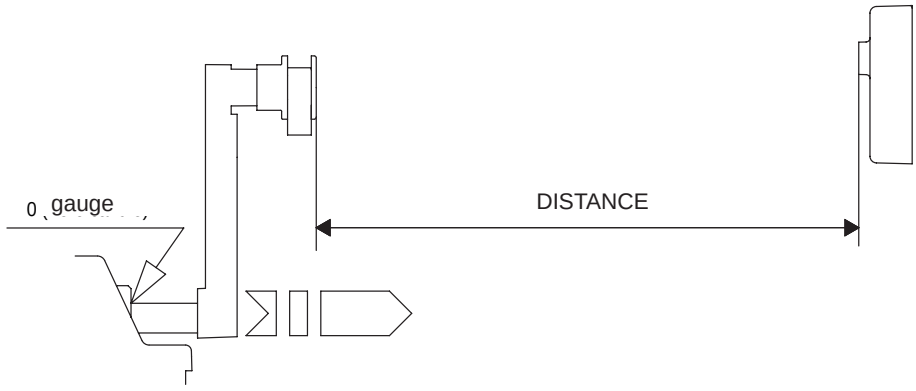


7.4.2 - Adapter eccentricity correction

This function allows electronic compensation of the systematic balancing error due, for example, to an eccentric adapter. It is not able to compensate for errors due to worn adapters or adapters with a certain amount of play. Never use this function unless advised by specialist personnel. Enter the password [7] [5] [3] [1].
Follow the instructions on the monitor.

When the Eccentricity Correction is enabled, the icon appears to the left of the screen

7.4.3 - Wheel balancer calibration

For calibration of the machine, proceed as follows:

- Use a medium-sized wheel with steel rim. Example: 6" x 14" (± 1")
- Preset the wheel dimensions with **GREAT CARE**.
- Follow the instructions appearing on the monitor.

7.4.4 - Ambient temperature

Ambient temperature is important for correct use of the sonars. Set the average temperature of the area where the wheel balancer is installed.

7.4.5 - Video interface

Select “STD”. Incorrect selection results in the images being displayed in very dark colours.

7.4.6 - Self-diagnostics

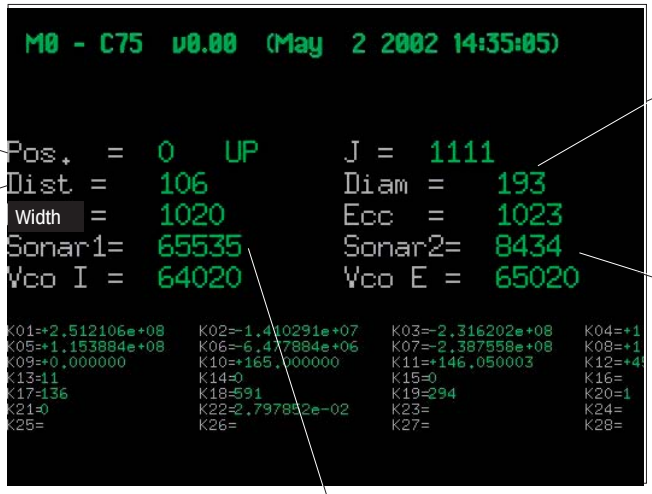
An automatic self-diagnostics cycle is provided for easier trouble shooting. At the end of the self-diagnostics cycle, several parameters are displayed which are useful for the Technical Service Department in order to identify machine faults.

STOP : returns to previous menu.

7.4.6.1 - To check the encoder

When the spindle is rotated:

- the angular position “POS” should vary from 0 to 128;
- the wording **“UP”** should appear when rotated clockwise and **“DOWN”** when rotated in the opposite direction.



Encoder check

Check for correct operation of the distance gauge; the number increases when the gauge is pulled out.

Check for correct operation of the diameter gauge; the number increases when the gauge is rotated outwards

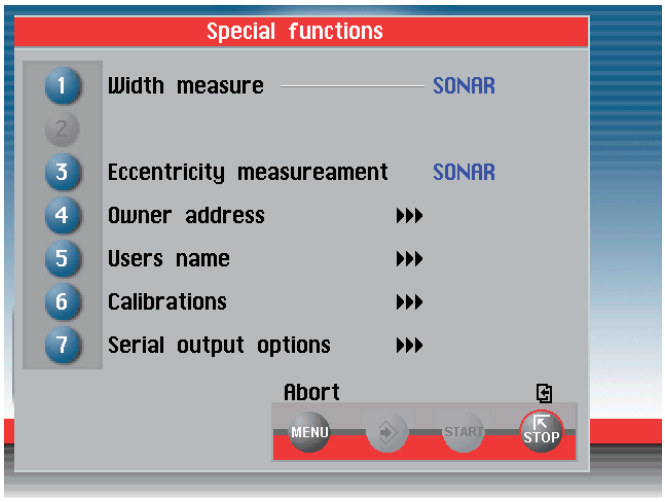
Check of the width sonar: the number decreases when a surface is approached to the sonar

Check of the eccentricity sonar (option): the number decreases when a surface is approached to the sonar

In the event of failure or faulty operation of the wheel balancing machine, notify the Technical Service of all the parameters displayed.

7.5 - Serial port options (option)

Enables the RS232 serial port and printer in the selection menus.



N.B.: If the two options are enabled at the same time, both will malfunction.

7.5.1 - Control of serial output RS232C

This option enables/disables the sending of the measured unbalance and phase values to serial output RS232C.

Transmission speed *= 9600 baud*
Data format *= 7 bit Start*
7 bit Data
1 bit Even parity
1 bit Stop

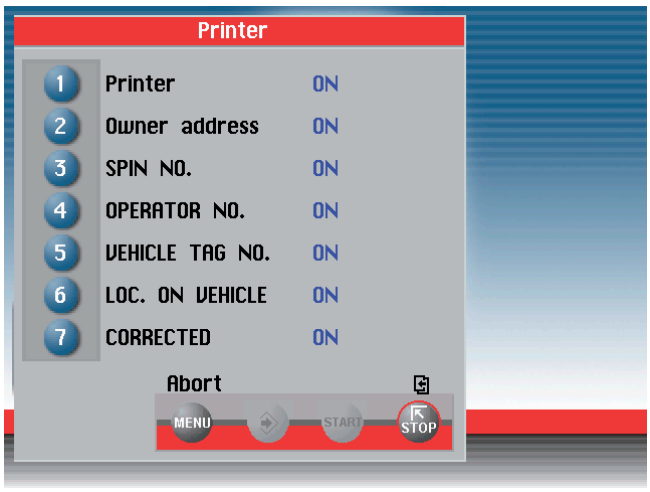
At the end of each unbalancing measuring spin, the balancing machine enables the RTS signal, then places the "$" character on standby to be able to transmit the data; all functions remain on hold until data transmission is enabled, at the end of which the RTS signal is reset to the inactive state.
The items of data transmitted via serial line are in ASCII format and are separated between each other by the <cr> character (0x0d).

Sending sequence is as follows:

- 00000 <cr>
- Value of correction weight, left side <cr>
- Correction phase, left side <cr>
- Value of correction weight, right side <cr>
- Correction phase, right side <cr>

The first 5 zero bytes represents the start of transmission message. The correction values are expressed in grams, in steps of .1 gram.
The phase values are expressed in degrees, in the range 0 ÷ 359
See specific computer board on exploded drawings.

7.5.2 - Printer management



Enable/disable printer and relative print options.

8 - Errors

ERRORS	CAUSES	CONTROLS
Black	The wheel balancer does not switch on.	1. Verify correct connection to the mains. 2. Verify and eventually replace the fuses on the power card. 3. Verify monitor function. 4. Replace the computer board.
Err. 1	No rotation signal.	1. Verify belt tautness. 2. Verify the function of the phase pick-up board and, in particular, the reset signal. 3. Replace the phase pick-up board. 4. Replace the computer board.
Err. 2	Speed too low during detection. During unbalance measurement rotation, wheel speed is less than 42 rpm.	1. Make sure that a vehicle wheel is mounted on the wheel balancer. 2. Verify belt tautness. 3. Verify the function of the phase pick-up board and, in particular, the reset signal. 4. Replace the computer board.
Err. 3	Unbalance too high.	1. Verify wheel dimension settings. 2. Check detection unit connections. 3. Perform machine calibration. 4. Mount a wheel with more or less known unbalance (less than 100 grammes) and verify the response of the machine. 5. Replace the computer board.
Err. 4	Rotation in opposite direction. After pressing [START], the wheel begins to rotate in the opposite direction (anti-clockwise).	1. Verify the connection of the UP/DOWN – RESET signals on the phase pick-up board.
Err. 5	Guard open The [START] pushbutton was pressed without first closing the guard.	1. Reset the error by pressing pushbutton [7]=End. 2. Close the guard. 3. Verify the function of the protection uSwitch. 4. Press the [START] pushbutton.
Err. 7 / Err. 8	NOVRAM parameter read error	1. Repeat machine calibration 2. Shut down the machine. 3. Wait for a minimum time of ~ 1 Min. 4. Re-start the machine and verify correct operation. 5. Replace the computer board.
Err. 9	NOVRAM parameter write error.	Replace the computer board.
Err. 11	Speed too high error. During unbalance measurement rotation, wheel speed is more than 270 rpm.	1. Check if there is any damage or dirt on the timing disc. 2. Verify the function of the phase pick-up board and, in particular, the reset signal. 3. Replace the computer board.
Err. 12	Unbalance measuring cycle error.	1. Verify phase pick-up board function. 2. Verify correct motor operation. 3. Verify belt tautness. 4. Replace the computer board.
Err.13 / Err.14 / Err.15 / Err.16 / Err.17 / Err.18	Unbalance measurement error.	1. Verify phase pick-up board function. 2. Check detection unit connections. 3. Verify machine earth/ground connection. 4. Mount a wheel with more or less known unbalance (less than 100 grammes) and verify the response of the machine. 5. Replace the computer board.

Err. 20	The wheel comes to a halt before completing positioning correctly.	1. Make sure that the wheel to be balanced is at least 10” in diameter. 2. Verify the correct setting of wheel dimensions on screen. 3. Verify belt tautness. 4. For wheels less than 12” in diameter wheels: disenable the eccentricity measurement procedure
Err. 30	Clock error	Replace the computer board.
Err.40/ Err.41/ Err.42/ Err.43	Eccentricity graph plotting procedure error.	Perform a new eccentricity measurement.
Err.45/ Err.46/ Err.47/ Err.48	Eccentricity graph value display readout error.	Perform a new eccentricity measurement.
Err.50/ Err.51/ Err.52/ Err.53	Eccentricity graph current value cursor plotting procedure error.	Perform a new eccentricity measurement.
Err.54	Sonar readout error. Sonar value readout impossible.	1. Position the eccentricity measurement sonar correctly before performing the measurement. 2. Check eccentricity sonar connections. 3. Check the power supplies on the power card. 4. Replace the eccentricity measurement sonar. 5. Make sure that the wheel does not halt before completing at least 4/5 revolutions after the first braking impulse. 6. Verify belt tautness. 7. Replace the computer board.
Err.55	Sonar readout error. Sonar values are insufficient for correct measurement of eccentricity.	1. Position the eccentricity measurement sonar correctly before performing the measurement. 2. Make sure that the wheel does not halt before completing at least 4/5 revolutions after the first braking impulse. 3. Verify belt tautness. 4. Mount a wheel of medium dimensions (14”x5 ¾”) and perform an eccentricity measurement . If in these conditions error 55 no longer occurs, this means that the wheel inertia causing the problem is such as to half the wheel before having acquired the minimum number of values necessary for reliable eccentricity measurement.
Err.65	Printer timeout	1. Check that a printer is present. 2. Check the code of the processor card. 3. Check the printer <-> processor card connection. 4. Run the printer test function.
Err.66	Printer buffer error	1. Reset the printer. 2. Repeat the print function.

9 - Routine maintenance

Before performing any action on the plant, isolate the electrical power supply.

9.1 - To replace the fuses

Remove the weight holder shelf to gain access to the power supply board where the 4 fuses are located (see Exploded Drawings). If fuses require replacement, use ones of the same current rating. If the fault persists, contact Technical Service.
NONE OF THE OTHER MACHINE PARTS REQUIRE MAINTENANCE.